

**Designing a
Thin & Light Notebook
with the
AMD Athlonä XP
Processor**

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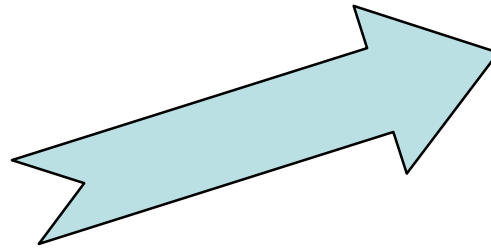
Introduction and Agenda

- ❑ Thin & Light Technology
- ❑ AMD Athlon™ XP Processor Thin & Light Features
- ❑ Independent Real World Test Results of AMD Athlon processor-based notebook

Thin & Light Origin

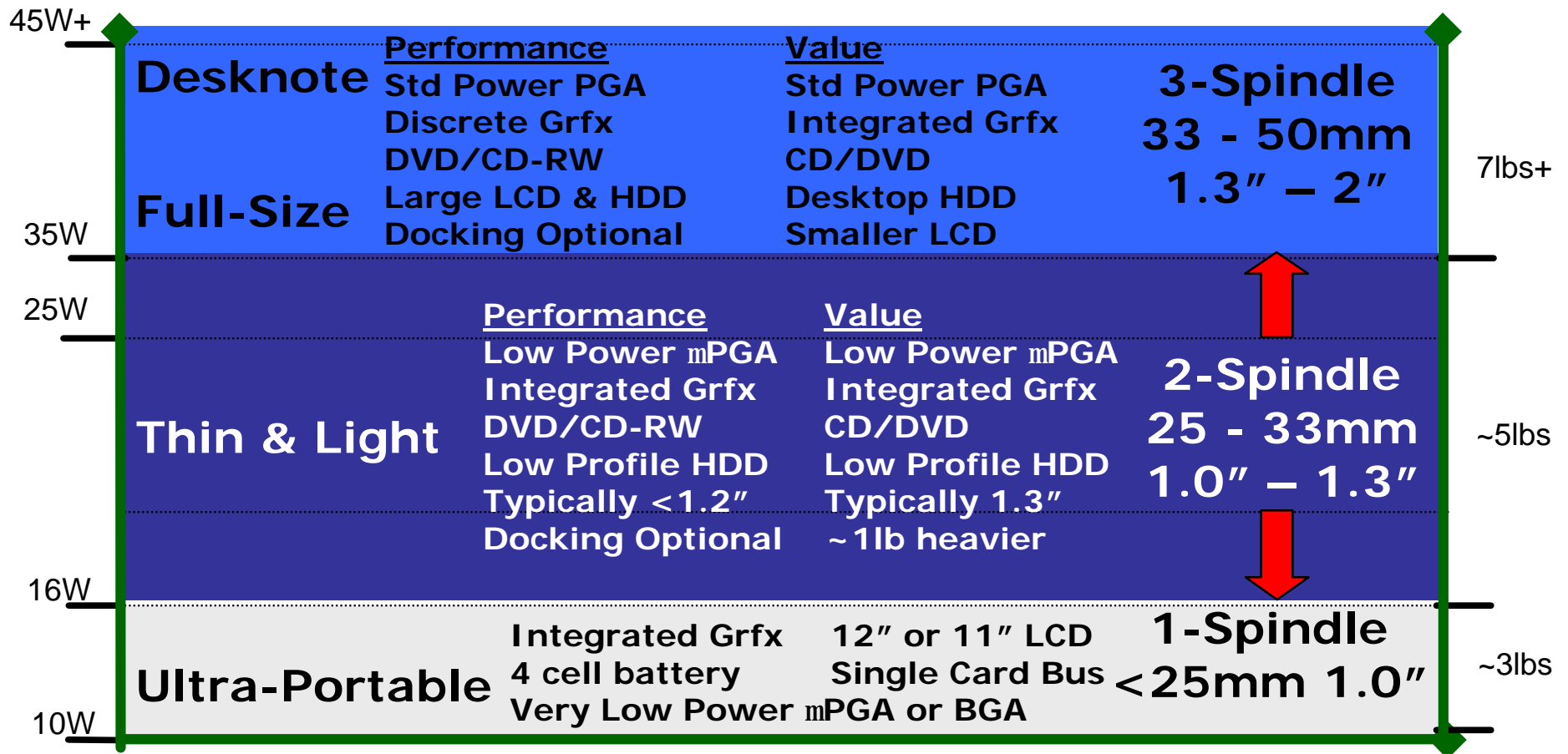


Homo Full-Sizus, emerged in the modern PC era and had a brain size between 1350-1400cc. They were the first to carry crude, luggable computing devices causing a stooped frame and stunted growth.



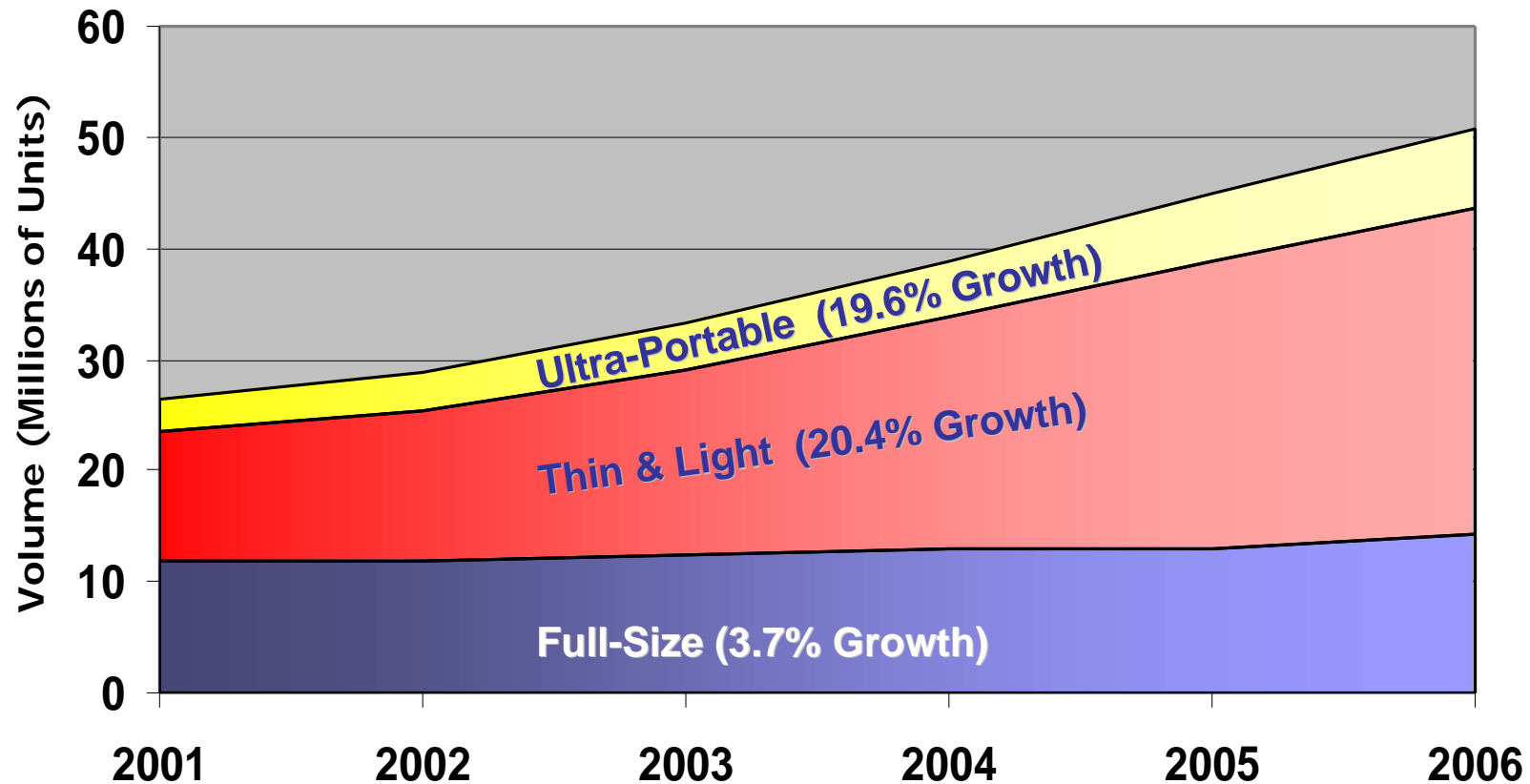
Homo Thinal Litorus, has the highest brain-to-body ratio. They were the first known remote e-mail communicators using highly portable laptops with lengthy battery life. During this time, their brains acquired one extra pound of neural tissue in the neocortex.

What is a Thin & Light Platform ?





Why Thin & Light ?



Mobile segment with large volume and excellent growth potential.

(AMD WW Mobile Market Estimate June 2002)
Growth – CAGR projected from 2001 - 2006

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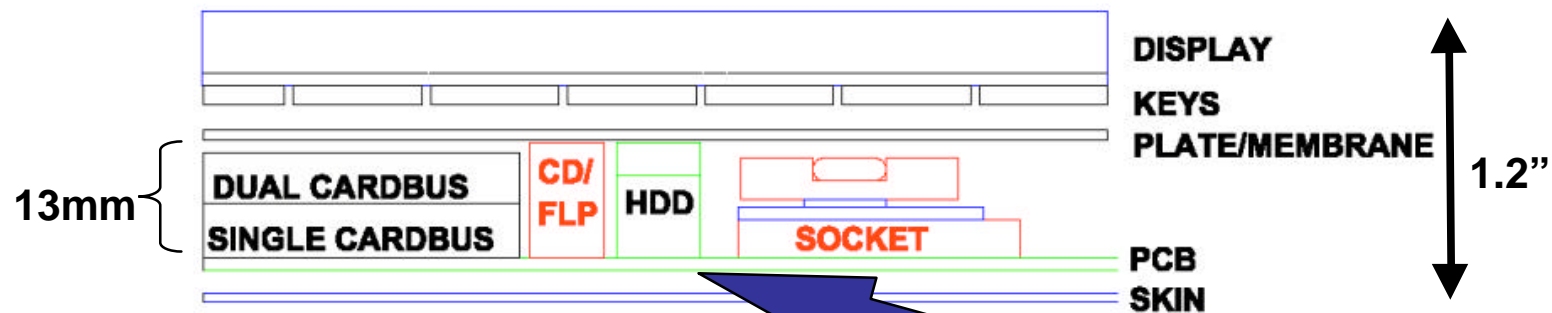


Thin & Light Target Platform?

Perfect blend of performance, features and capabilities with a high degree of portability

- ❑ Components – Efficient and Small
 - Smaller and Lighter HDD – single vs. multi-platter
 - Smaller and Lighter Battery – 6 cells vs. 8 (or more) cells
 - Low profile sockets and surface mount attach methods
- ❑ Standard features - Less expandability and options
 - PC Card, USB Ports, Mini-PCI, SoDIMMs, etc.
- ❑ Maintain user experience – Target key features
 - Large display, keyboard, input interface
 - Processor, Graphics and Audio performance
 - Portable performance and usability

Getting it Thin



❑ Total Thickness: 30.5mm (1.2")

- Display and Panel Thickness: 7.5mm
- Keyboard and Membrane: 6.5mm
- Skin, Mount and PCB: 3.5mm

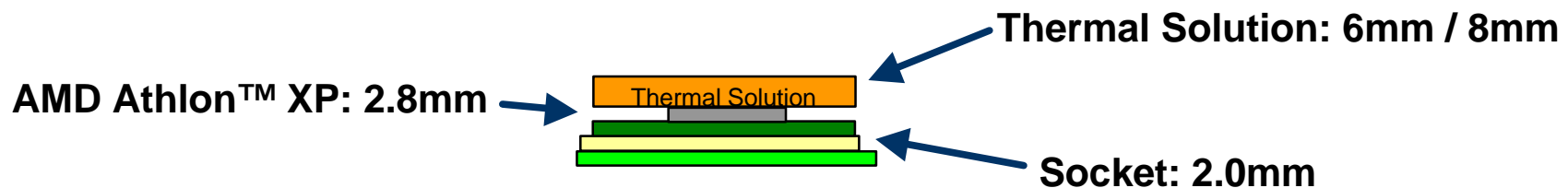
Total Height Available to CPU above PCB: 13.0mm

Cut-out
option
>13mm

CD and HDD support profile heights below 13mm

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Thin & Light Processor



□ Height for Thin & Light Processor Solution: 13.0mm

- uPGA Low Profile Socket: 2.0mm
- uPGA Processor (die/substrate): 2.8mm
- Heat Pipe & Thermal Solution: 6mm (8mm max.)

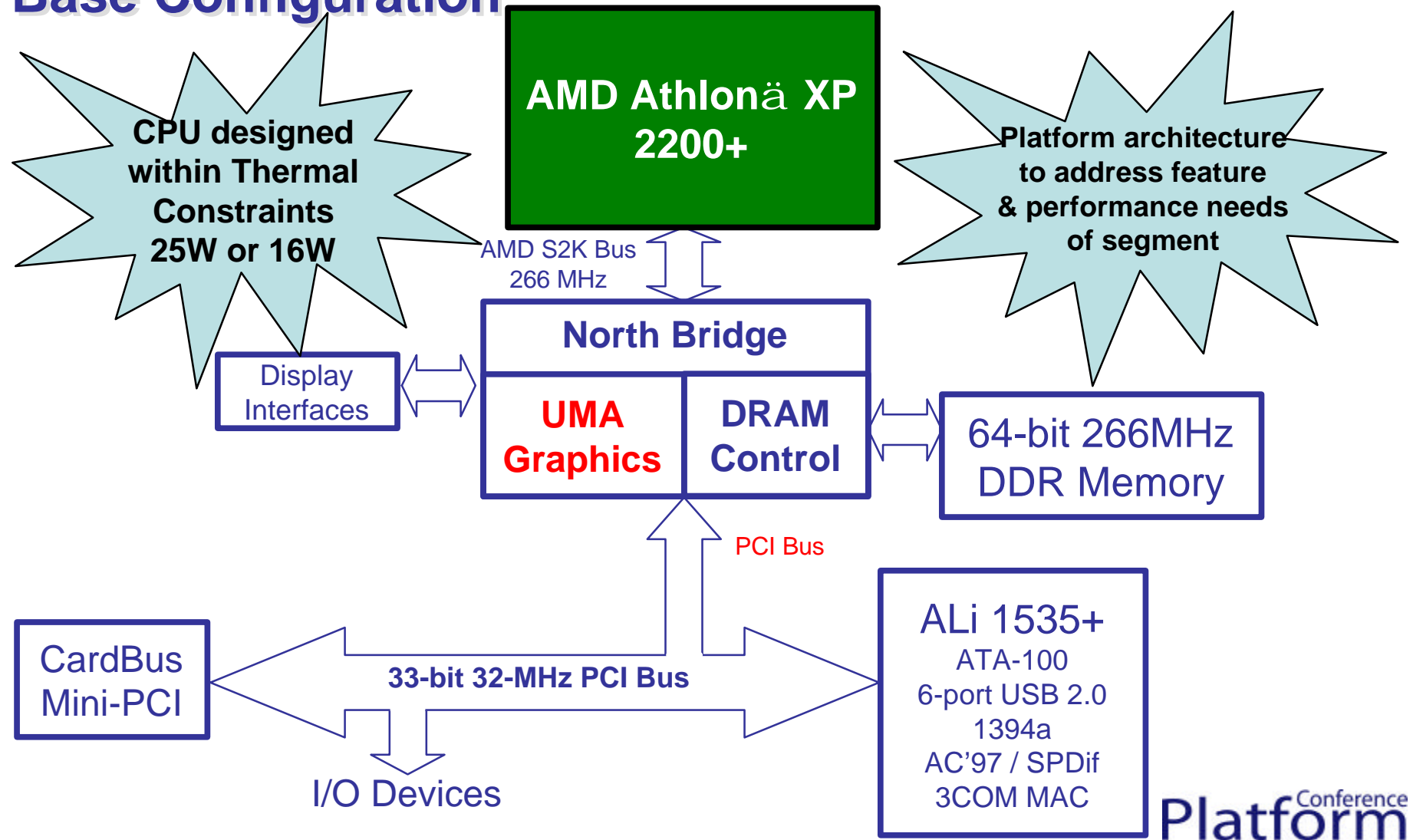
Total Height of AMD Athlon™ XP processor Solution: 12.8mm (max)

The AMD Athlon XP processor fits comfortably within the Thin & Light Platform constraints.

The 33x33mm body size is ~50% smaller than PGA

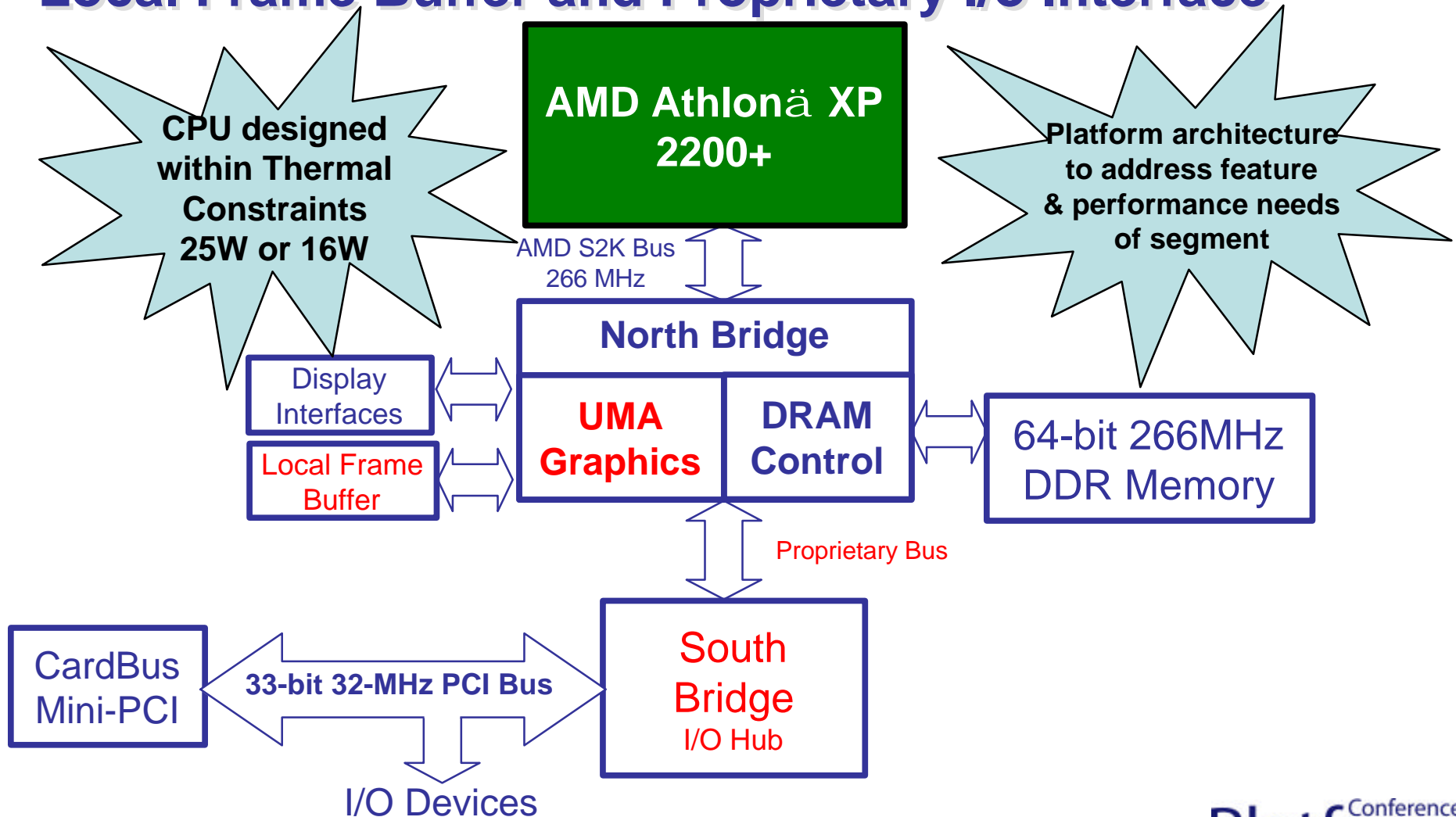
AMD Athlonä XP Processor T&L Diagram

Base Configuration



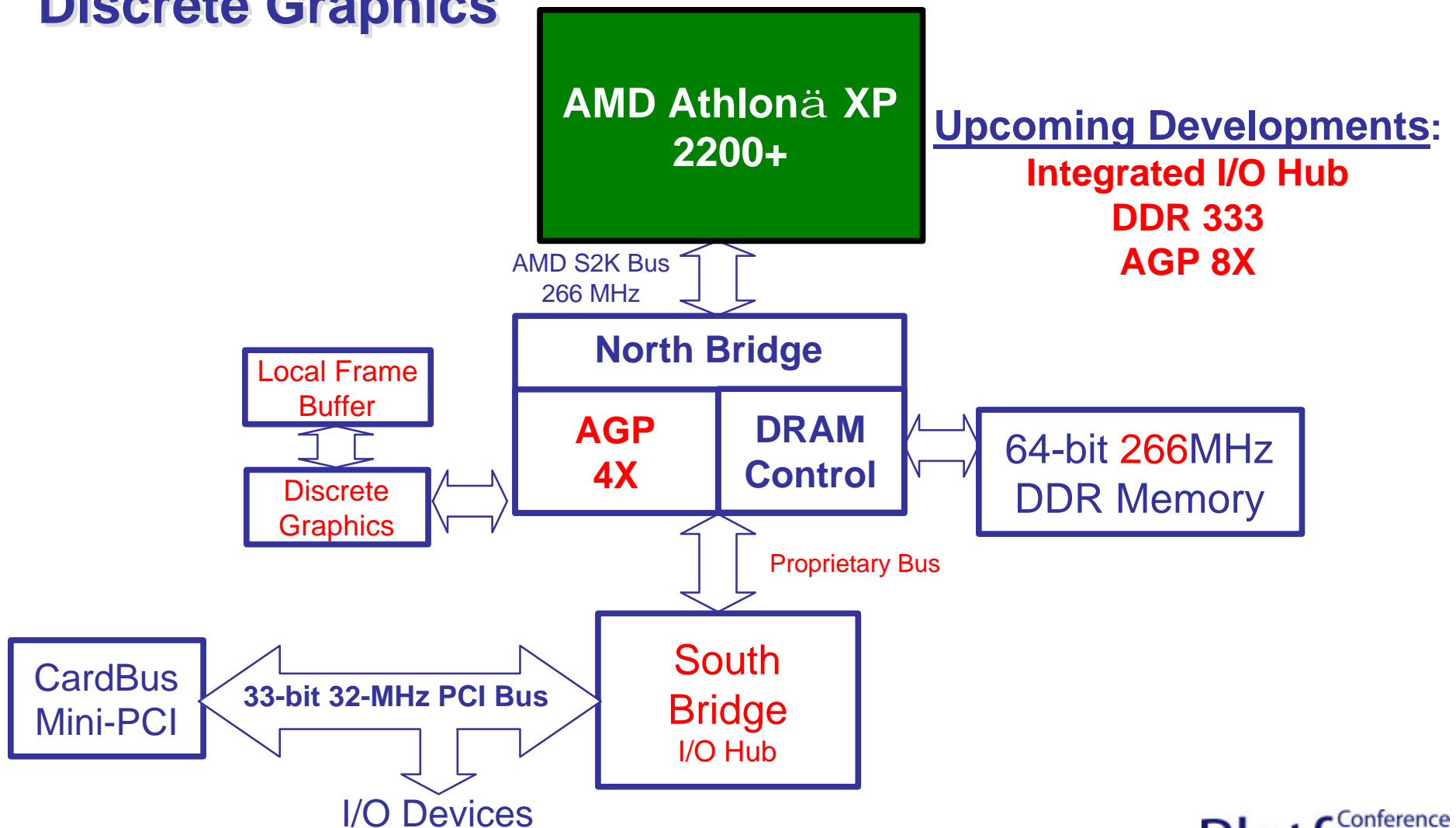
AMD Athlonä XP Processor T&L Diagram

Local Frame Buffer and Proprietary I/o Interface



AMD Athlonä XP processor T&L Diagram

Discrete Graphics





CPU – the most important piece

Thermal and physical size constraints of the form factor limit possible choices

- ❑ Proper processor design and features can provide Full-size performance in smaller form factors
 - Increased efficiency provides increased performance
 - Architectural improvements more important than frequency (no penalty)
 - Power Management features maximize efficiency
 - ACPI for idle periods, AMD PowerNow!™ during active execution
 - Power friendly transistor and process
 - Smaller and lower is better



AMD Athlon™ XP

❑ AMD Athlon™ Processor with QuantiSpeed™ Architecture

- AMD Athlon XP Processor does more per clock cycle
 - Superscalar pipelined microarchitecture
 - Offers outstanding application performance
 - No power penalty for architectural efficiency
- eXtreme Performance

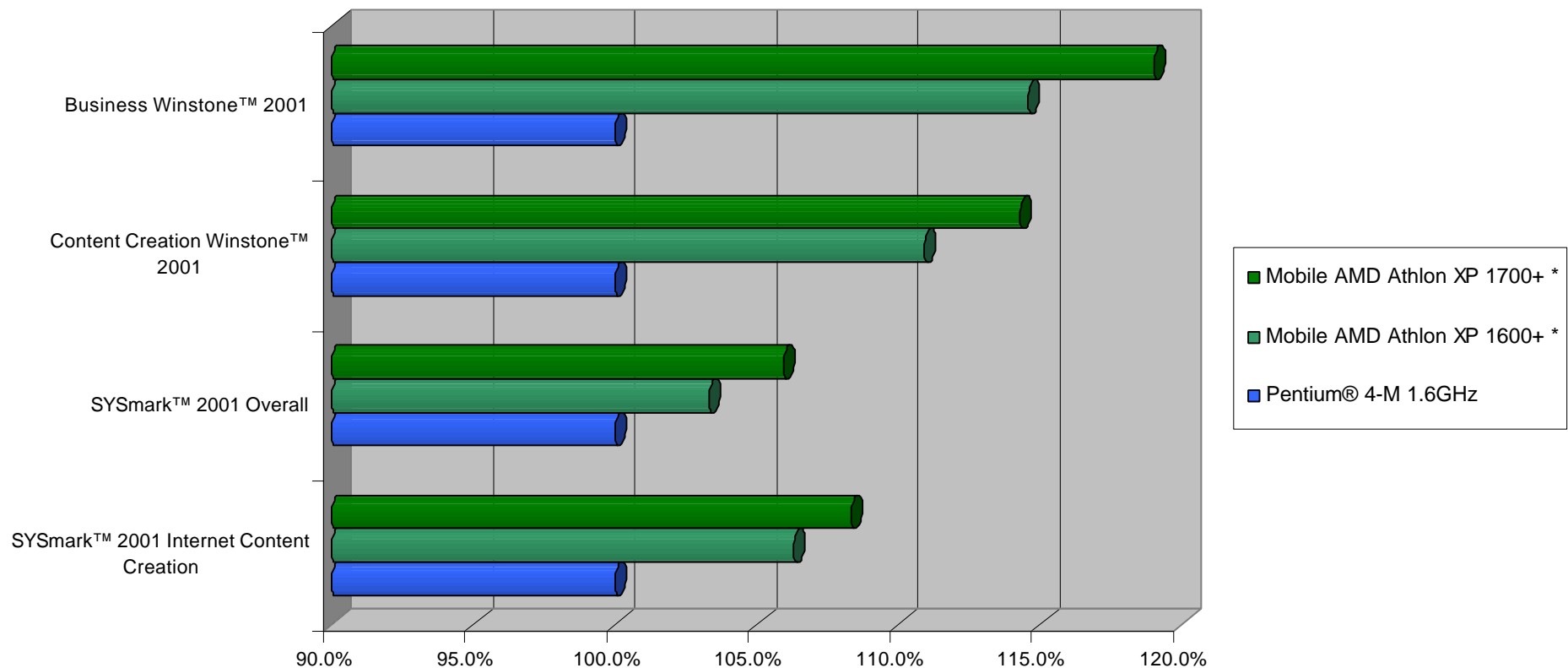
❑ Advanced 130nm manufacturing process

- More performance at lower power than 0.18μ
- Lower core voltage = lower power



Mobile AMD Athlon™ XP Processor

1700+ and 1600+



* Quantispeed™ architecture operates at the following frequencies for these model numbers: 1700+ operates at 1.47GHz and the 1600+ operates at 1.4GHz.

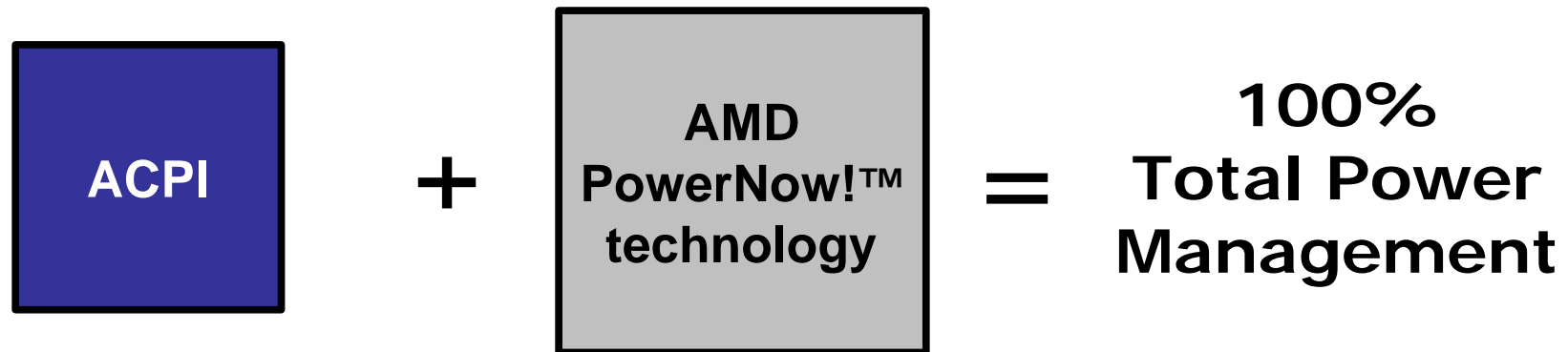
** Please see back-up slides #27 – 28 for system configuration and patch information

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Power Management



- ❑ AMD PowerNow!™ technology –Active Power Management
 - Demand-based Voltage & Frequency
 - Multiple Voltage and Frequency Steps
 - AMD PowerNow! technology support available through (5) ACPI v2.0 objects
 - Microsoft Windows® XP support
 - **Available across all AMD Mobile processors**
- ❑ ACPI Standard Protocol –Idle Power Management
 - ACPI Controls CPU Performance State
 - Native Support in Windows XP
 - AMD PowerNow! driver for many previous Operating Systems



Mobile AMD Athlon™ XP Processor

☐ Optimal Thin & Light Solution

- Delivering high performance for Thin & Light Notebooks
- Exceeds physical platform requirements – small uPGA package
- Thin & Light power profile – 25W and 16W
- Maximum Efficiency

☐ Active AMD PowerNow!™ technology

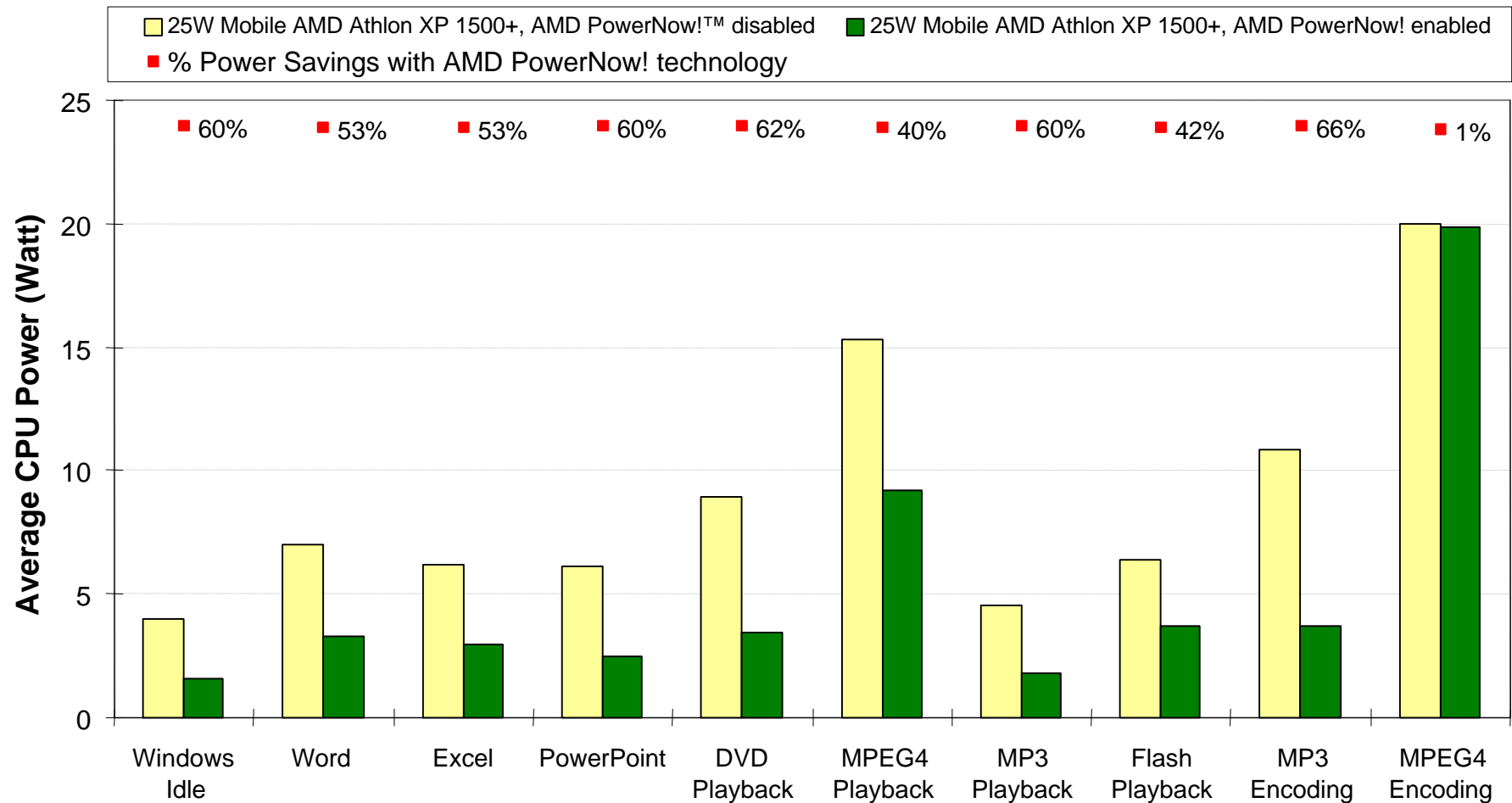
- Designed to extend battery life without compromising performance

☐ Standard ACPI Protocol



25W Mobile AMD Athlon™ XP Processor

Power Savings



See slide 28 for system configuration information

Platform



Translation: Specifications to the Real World

❑ Independent Industry Assessment

Reference:

www.tomshardware.com

Tom's Hard News Vol. II/No. 18

Wednesday, May 15, 2002

"ATi's Radeon IGP320M Chipset – A
New Chance For [AMD] Athlon
Notebooks"

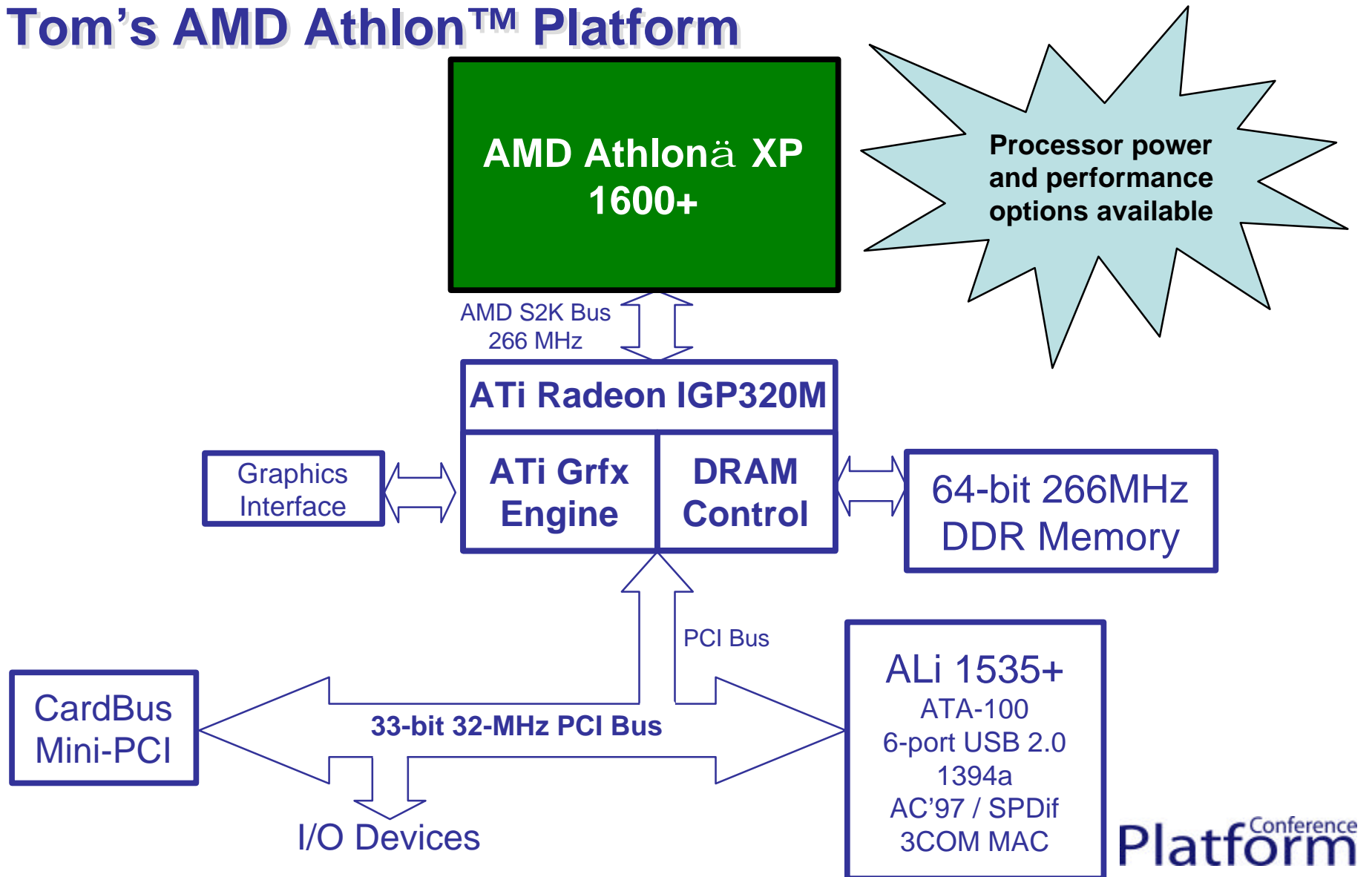


Tom's AMD Athlon™ Platform Description

- ☐ CPU: AMD Athlonä XP 1600+
- ☐ Northbridge: ATi Radeon IGP320M
 - Memory: 64-bit DDR-266
 - Graphics: Integrated ATi Core
- ☐ Southbridge: ALi I/O Hub

Block Diagram

Tom's AMD Athlon™ Platform





The Competition

- ❑ Dell Inspiron 8100
 - Pentium® III-M 1.2 GHz, SDRAM 133, ATi Mobility Radeon 7500
- ❑ Dell Latitude C840
 - Pentium 4-M 1.6GHz, DDR-266, nVidia GeForce4Go 440



Test Results

	Tom's AMD Athlonä Platform	Dell 8100	Dell C840
CPU Performance Sisoft Sandra 2002	3850 MIPS	3302 MIPS	3069 MIPS
PCMark 2002	4000	3805	3906
SYSmark™ 2002 Office	105	99	120
BatteryMark™	171 min	131 min	153 min
DVD Playback Rundown	151 min	126 min	126 min
DVD CPU Usage	28%	16%	25%

Please see Slide 29 for detailed system configuration information

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Designing AMD Athlon™ Thin & Lights

- ❑ Select a Thermal Envelope
 - 25W and 16W AMD Athlon™ XP processor for performance and portability
 - Physical Characteristics and Chassis
- ❑ Select a Performance and Price Point
 - Define Platform architecture
 - Component and feature selection
- ❑ Engage AMD Platform Validation Team

Input for AMD to Drive Technology
Complementors and Partners Forward



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Windows is a registered trademark of Microsoft Corp.

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Back-up

Mobile AMD Athlon™ XP Processor 1700+ and 1600+ Benchmark System Configurations

Operating System	Windows® XP	Microsoft Windows XP Professional, DirectX version 8.1 (4.08.01.0810) (Updated Windows® Media Encoder Results contain a software update which enables 3DNow!™ Professional technology in version 7.0 of Microsoft Windows® Media Encoder. This software patch is not publicly available; however the current version of Microsoft Windows Media Encoder 8 enables support for 3DNow! Professional technology.)
Hardware	Chipset	ATI Radeon IGP320M
	Memory	256MB MB DDR
	Hard Drive	IBM 20.5GB IDE, model: IC25N020ATCS04-0
	Network	Realtek RTL8139
	Sound	ALi Audio Accelerator
	Video	ATI Integrated Graphics
Drivers	AGP Miniport	ATI Technologies version 5.0.2072.0
	EIDE Drivers	Provided by Windows XP
	Network	Provided by Windows XP
	Sound	Provided by Windows XP
	Video	Provided by ATI, v6.13.10.6064

Intel Pentium® 4-M 1.6GHz

Benchmark System Configurations

Operating System	Windows® XP	Microsoft Windows XP Professional, DirectX version 8.1 (4.08.01.0810)
Hardware	System	Dell Inspiron 8200 (BIOS A02)
	Chipset	Intel 845MP
	Memory	256MB MB DDR
	Hard Drive	IBM 20.5GB IDE, model: IC25N020ATCS04-0
	Network	3Com 3C920
	Sound	Intel 82801CA/CAM AC'97 Controller
	Video	nVidia GeForce2 Go (32MB)
Drivers	AGP Miniport	Provided by Windows XP
	EIDE Drivers	Provided by Windows XP
	Network	Provided by Windows XP
	Sound	Provided by Windows XP
	Video	Provided by Windows XP



Mobile AMD Athlon™ XP System

CPU	25W Mobile AMD Athlon™ XP 1500+ (1.3GHz/100MHz FSB), Thoroughbred core Performance States: 500/1.05V, 700/1.05V, 900/1.10V, 1100/1.20V, 1300/1.30V
Motherboard	AMD Porch Swing 2 eval board (BIOS: Rev. ACRD00-U) Chipset: AMD 761, AMD-766 * This motherboard is not publicly available
Memory	256MB PC2100 DDR SDRAM, CL=2.5
Video	ATI Rage Mobility 128-M (16MB) eval board 1024x768 (32-bit color) @85Hz
Hard Drive	Western Digital Caviar 102AA, 10.2GB, 5400RPM, ATA66
DVD-ROM Drive	Acer 10x DVD-ROM drive
Operating System	Microsoft® Windows® XP Professional Version 2002
Test Setup	Halt bus disconnect enabled Stop Grant bus disconnect enabled C2/C3 enabled Enable AMD PowerNow!: Select "Portable/Laptop" power scheme Disable AMD PowerNow!: Select "Always On" power scheme



Tom's Mobile AMD Athlon™ XP System

CPU	35W Mobile AMD Athlon™ XP 1600+ (1.4GHz/133MHz FSB), Thoroughbred core
Chipset	ATi Radeon IGP320M ALI 1535+ Southbridge (connected via PCI)
Memory	512MB PC2100 DDR SDRAM
Video	ATI (Integrated into IGP320M)
Hard Drive	60GB IBM Travelstar 60 (5400 RPM)
Operating System	Windows® XP Professional
Peripherals	DVD/CDRW Combo 3 ½" Floppy 100/10Mbit Ethernet 56K Modem (2) USB 1.1 Ports S-video OUT Parallel connector 1394 connector IR-port (1) Type II or III PCMCIA slot

See Tom's Hardware (http://www.tomshardware.com/mobile/02q2/020516/radeon_igp320m-05.html)
for further details